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## THE URINARY EXCRETION OF SILICA BY PERSONS EXPOSED TO SILICA DUST

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It has been demonstrated by numerous researches that silicosis is caused by the inhalation of silica dust. Not only has an excessive amount of silicosis been found associated with an exposure to such dust, but autopsy material has furnished additional proof, in that it has been possible to recover excessive amounts of silica in the ash of the lungs of silicotic persons. More recently, King (1) has demonstrated, as a result of his work on the metabolism of silica, that the urinary excretion of silica is at a higher level in persons exposed to silica dust than in normal individuals. King says, in part: "In the case of human beings it is probable that large numbers of extremely fine particles, smaller even than the very fine particles observable under the microscope in the lungs of individuals exposed to a dusty atmosphere, are constantly finding their way into the lung. In contact with the fluid in the lung these smallest of particles may suffer rapid solution, the larger particles slower and only partial solution. In this way there may be constant drainage of silica from the lung, the dissolved silica being carried away by the blood to be excreted in the urine."

The present brief study was undertaken for the purpose of obtaining further evidence that the lung changes associated with the inhalation of dust in the anthracite coal industry are caused by an exposure to both coal and silica dust. In a recent study of the health of workers in the anthracite coal industry (2) conducted by the Office of Industrial Hygiene and Sanitation of the Public Health Service, it was found that the workers were subjected to the inhalation of dust varying in total silica content from 11 to 63 percent, and in quartz content ranging from 4 to 43 percent. Pathological studies of some of these workers showed their lungs to contain silica and carbonaceous material in excess of the amounts present in

normal lungs. All the evidence gathered seemed to point to the fact that the condition found among these workers may be attributed in part to the silica dust to which they were exposed; and as a result of these findings this condition in the anthracite workers was termed "anthraco-silicosis." It was felt, therefore, that the recovery of excessive amounts of silica in the urine of these mine workers, whose silica dust exposure had been established in a quantitative manner, would furnish further proof of the abnormal intake of silica dust.

#### PLAN OF STUDY

The present study was conducted on a group of men whose exposure had been previously evaluated as to the composition, size, and quantity of dust, and whose years of trade life were also known. Table 1 shows the distribution of the men in the different occupations entailing varying degrees of exposure to silica dust in the mines studied.

TABLE 1.—*Distribution of mine workers examined for urinary silica excretion*

Occupational group	Number of men	Silica dust exposure, percent	
		Total silica	Quartz
Miners.....	36	11.1	3.1
Rock workers.....	24	63.2	35.2
Inside transportation men.....	20	33.7	13.0
Outside workers.....	23	13.5	4.3
Former miners.....	20	11.1	3.1
Total.....	123		

Urine specimens were collected in most cases in 2-quart capacity cans and were immediately analyzed for silica at the mines by the method described by King and Dolan (1). Of the 123 samples obtained, 73 (59 percent) were 24-hour specimens. Specific gravity, albumin, and sugar were included in the analysis.

#### RESULTS OF STUDY

The silica content of the urine in milligrams per 100 cc varied from 0.6 to 11.7 and averaged 2.5. Urine specimens of 11 laboratory and office workers were analyzed for control purposes and showed an average silica content of 1.0 milligram per 100 cc. These findings are in agreement with those reported by King and Dolan. Through the courtesy of Assistant Sanitary Engineer J. M. DallaValle, of this Office, it was possible to examine 20 specimens of urine from steel-foundry workers. The results of these analyses showed the foundry workers to be excreting an average of 2.6 milligrams of silica per 100 cc. The specific gravity determinations showed no relationship to the silica

content of the urine. This result is also in agreement with King's work on the excretion of silica by gold miners.

In the study of the health of anthracite coal workers it had been possible to obtain excellent correlations between clinical findings and the composition and amount of dust, together with the years of exposure, when the latter three factors were expressed in one term; namely, silica particles-years. Consequently, a similar procedure was used in an attempt to determine the relationship between the total silica dust exposure and the amount of urinary silica. The results of such an analysis are presented in table 2.

TABLE 2.—*The relationship between the silica dust exposure of anthracite coal workers and urinary silica*

Exposure in millions of silica-dust particles-years	Milligrams of silica excreted per 100 cc of urine										Average silica excretion per 100 cc urine
	Number of persons in each group					Percent of persons in each group					
	Less than 1.0	1-1.9	2-2.9	3 or more	Total	Less than 1.0	1-1.9	2-2.9	3 or more	Total	
Less than 500.....	14	22	12	8	56	25	39	21	15	100	1.7
500-999.....	1	2	7	4	14	7	14	50	29	100	2.9
1,000-1,999.....	2	6	0	9	17	12	35	0	53	100	3.4
2,000 or more.....	0	6	3	7	16	0	38	19	43	100	3.6

It appears from these results that there is a definite relationship between the amount of silica dust inhaled over a period of years and the urinary silica found in the workers. The actual correlation is 0.48, and the probable error 0.04. It is interesting to note that aside from the gradual increase in urinary silica with an increase in exposure, as shown in the last column, no person with an exposure to more than 2,000 million silica dust particles-years was excreting less than the amount of silica found in normal persons (1.0 milligrams per 100 cc of urine), and that 62 percent of the workers in this group were excreting silica in excess of 2.0 milligrams per 100 cc. On the other hand, 64 percent of the persons with an exposure to less than 500 million silica particles-years were excreting silica in their urine in amounts less than 2.0 milligrams per 100 cc.

Table 1 indicated that 20 former miners were included in this study. These men were residing in a sanatorium for chronic diseases; and since they were all living under similar conditions, the factor of diet, which was shown by King to influence the urinary silica excretion, would not enter into the present picture. These former mine workers were found to have had an exposure to anthracite coal dust averaging 37 years and had been out of the industry an average of 7 years. The average urinary silica of these men was 2.1 milligrams per 100 cc, and was greater than the amounts found in non-miners at the same

institution. This finding is also in agreement with that of King and Dolan, who obtained corresponding data on a group of 6 gold miners not exposed to dust at the time of examination. The anthracite mine workers who had been free from dust exposure for less than 5 years were found to be excreting slightly more silica than those who had been away from the industry for a longer period.

The present brief inquiry does not furnish sufficient data to determine the value of the urinary silica examination as an aid in the diagnosis of anthraco-silicosis. Excessive silica excretion probably merely indicates an abnormal intake of silica. It does, however, furnish additional evidence of the etiology of the disease.

#### SUMMARY

One hundred and twenty-three anthracite coal workers, 20 of whom had been out of the industry an average of 7 years, were examined for urinary silica by the method of King and Dolan. The amounts of silica found in the urine varied from 0.6 to 11.7, and averaged 2.5 milligrams per 100 cc. Normal individuals were found to be excreting only an average of 1.0 milligram per 100 cc. A close correlation was found between the silica dust exposure of these men for a specified number of years and the amount of urinary silica. A study of former anthracite coal workers showed that even after a lapse of several years away from any silica dust exposure, an increased amount of silica is being excreted by them. These findings furnish additional evidence of the etiology of the disease.

#### REFERENCES

- (1) King, Earl J., and Dolan, Margery: Silicosis and the metabolism of silica. *The Canadian Medical Association Journal*, Vol. 31, pp. 21-26. 1934.
- (2) Public Health Bulletin, U. S. Public Health Service. In preparation.

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## MOTTLED ENAMEL IN TEXAS

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#### INTRODUCTION

Since 1916 there have been occasional references (1), (2), (3), (4), in the literature inviting attention to the presence of mottled enamel in west Texas. In 1932 (5) a detailed questionnaire survey by the United States Public Health Service indicated that the Panhandle-west Texas region was probably the largest mottled enamel area in the United States with more people affected. This report showed that there were at least 26 west Texas counties in which mottled

enamel was endemic and that such large centers of population as the cities of Amarillo, Lubbock, and Plainview were seriously affected. In addition, the possibilities of other affected areas in Texas became evident when mottled enamel was reported as endemic at Taylor, in Williamson County. Lemmon (6), a pediatrician, has recently called to the attention of the Texas medical profession the relationship between mottled enamel and child hygiene and nutrition.

#### METHOD OF SURVEY

This survey was a cooperative study made by the United States Public Health Service and the Texas State Department of Health during November and the early part of December 1934. Each of the communities hereinafter referred to was visited, and subsequently, with the cooperation of the local superintendent of education, school children, generally of the fourth, fifth, and sixth grades, were examined. A total of 66 cities, towns, or rural communities in 44 counties was visited and 3,723 school children were examined. The purpose of the survey was to obtain general information relative to the extent of the affected territory and a rough index of the degree of severity of the mottled enamel being produced.

Upon visiting a classroom, the purpose of the survey was first explained, and those children who had lived in the community continuously since birth and who had always used the city water for domestic purposes (cooking and drinking) were assembled in a separate group. This group was further questioned to determine whether there had been any breaks in the continuity of their residence and water consumption. Under good illumination each child was examined by one of us (H. T. D.) and the presence or absence of mottled enamel recorded. The degree of severity was noted in accordance with a standard of classification previously described (7). In many instances the children with variable residences and water histories were likewise examined under the same conditions.

The basis upon which the various degrees of mottle enamel were classified is, briefly, as follows:

#### NORMAL (FIG. 1)

The enamel presents the usual translucent semivitriform type of structure. The surface is smooth, glossy, and usually of a pale, creamy white color. In addition to those teeth showing normal calcification, for purposes of mottled enamel classification there is also included under this heading all individuals with permanent teeth showing hypoplasias *other* than mottled enamel. Such hypoplasias of the enamel are, in the main, those characteristic of Hutchinson's teeth and the hypoplasias concomitant with the exanthematous diseases and nutritional disturbances during the period of the enamel development of the permanent teeth. If an examination of a person reveals the presence of one of the previously mentioned hypoplasias *and* mottled enamel, the examination is recorded solely

on the basis of the mottled enamel present and is listed under its proper mottled enamel classification.

#### QUESTIONABLE (FIG. 2)

In areas of relatively high endemicity, over 75 percent, there are at times cases which the experienced investigator occasionally hesitates to classify either as apparently normal or very mild. Such cases are listed as questionable. In studying a "border line" area, or a community where the causative factor of mottled enamel is present in the water supply quantitatively somewhere between the maximum harmless amount and the minimum capable of producing the "very mild" and "mild" type of mottled enamel in 35 percent or more of the children who have used the particular water exclusively from birth, this classification is frequently needed. In such areas there is generally a higher percentage of individuals classed as normal than the combined group of "very mild" and "mild." There is, however, always a certain percentage of those individuals with comparable histories, that discloses slight aberrations in the translucency of normal enamel ranging from a few white flecks to occasional white spots. Furthermore, in some instances, thin, irregular, white, opaque streaks, or veining, are noted on the incisal third of the superior incisors. In other cases the tip of the summit of the bicuspid shows an unusual white opacity two or three millimeters in extent, the remainder of the tooth being apparently normal. As such cases are not sufficiently developed to be classed as "very mild", and are definitely not "normal", they are listed as questionable.

#### VERY MILD (FIG. 3)

Small, opaque, paper-white areas are scattered irregularly or streaked over the tooth surface. This mottling is principally observed on the labial and buccal surfaces and involves up to 25 percent of the tooth surface of the particular teeth affected. Small, pitted, white areas are frequently found on the summit of the cusps. Brown stain is rarely observed in the mottled enamel of this classification and, if present at all, is so faint as to be almost indistinct.

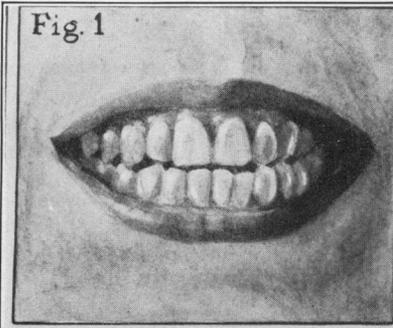
In areas of high endemicity, mottled enamel is not infrequently observed on the deciduous molars and occasionally the deciduous cuspids. Mottled enamel in deciduous teeth is generally of the very mild type, even though the permanent teeth in the same individual may show moderate to severe mottling.

#### MILD (FIG. 4)

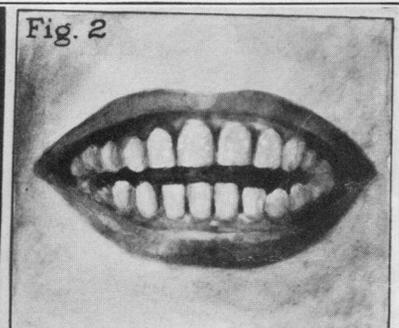
The white opaque areas in the enamel of the teeth involve at least half of the tooth surface. The surfaces of molars, bicuspid, and cuspids subject to attrition show thin white layers worn off and the bluish shades of underlying normal enamel. Light brown stains are sometimes apparent, generally on the superior incisors.

#### MODERATE (FIGS 5 AND 6)

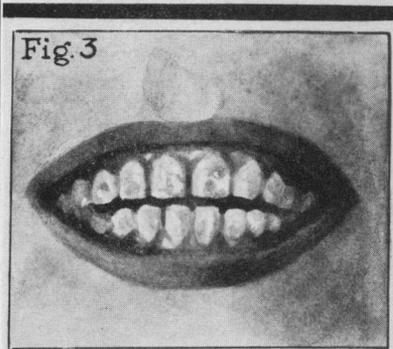
No change is observed in the form of the tooth, but generally all tooth surfaces are involved. Surfaces subject to attrition are definitely marked. Minute pitting is often present, generally on the labial and buccal surfaces. Brown stain is frequently a disfiguring complication. For the most part the stain ranges from tan to chocolate in color and not infrequently involves as much as half of the labial surface. It must be remembered, however, that the incidence of brown stain varies greatly in different endemic areas and many cases of white opaque mottled enamel, without brown stain, are classified as "moderate" and listed in this category.



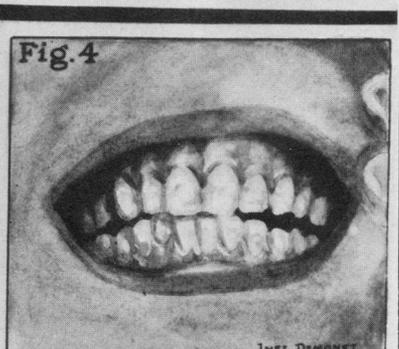
NORMAL \*



QUESTIONABLE



VERY MILD



MILD

\* THE APPARENT WHITE SPOTS ON THE LABIAL AND BUCCAL SURFACES, IN THIS REPRODUCTION (NORMAL) DEPICT "HIGH LIGHTS" AND ARE NOT MOTTLED ENAMEL.

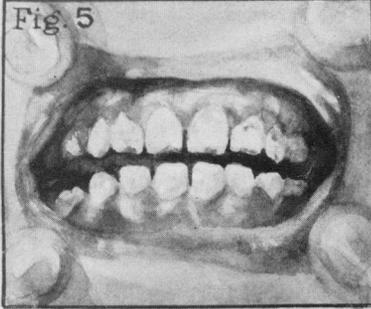


Fig. 5

**MODERATE**  
*White opaque*

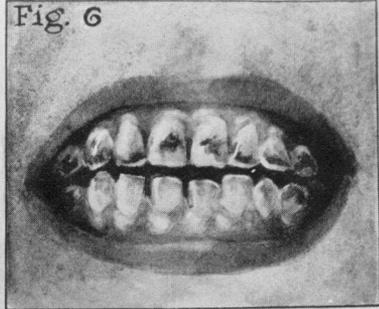


Fig. 6

**MODERATE**  
*Brown stain.*

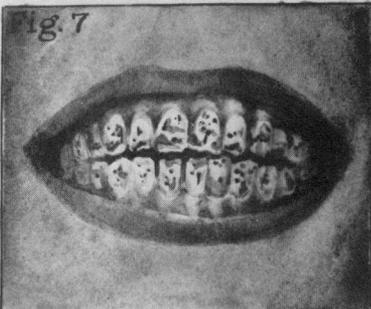


Fig. 7

**MODERATELY SEVERE**  
*Discrete pitting.*

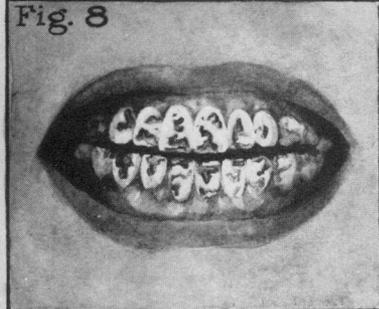


Fig. 8

**SEVERE**  
*Confluent pitting*



Fig. 9

**SEVERE**  
*Brown stain*

INEZ DEMONET

## MODERATELY SEVERE (FIG. 7)

Macroscopically a greater depth of enamel appears to be involved. A smoky white appearance is often noted. Pitting is more frequent and generally observed on all tooth surfaces. The pits are discrete and may be 1 to 2 millimeters in diameter. Brown stain, if present, is generally deeper in hue and involves more of the tooth surface. The diagnostic sign of this classification is, however, the discrete pitting.

## SEVERE (FIGS. 8 AND 9)

The hypoplasia is so marked that the form of the teeth is at times affected; the older children often present a mild incisal-occlusal pathological abrasion. The pits are deep and very often confluent. As a result of confluent pitting, which is the diagnostic sign of this classification, the outer surface of the enamel is lost in places and the tooth often presents a corroded-like appearance. Stains are widespread and range in color from chocolate brown to almost black.

## MOTTLED ENAMEL INDEX OF A COMMUNITY

The various degrees of mottled enamel severity having been defined, the application of this classification to the determination of a mottled enamel index of a community is necessary for epidemiological purposes and subsequent correlation with chemical and other studies.

Accordingly the following indexes have been arbitrarily defined in terms of the degree of severity of mottled enamel observed clinically:

**NEGATIVE:** When less than 10 percent of the children show "very mild" or more severe types of mottled enamel.

**BORDER LINE:** When 10 percent or more, but less than 35 percent, show "very mild" mottled enamel or worse.

**SLIGHT:** 35 percent or more show "very mild" or worse, but less than 50 percent are mild or worse, and less than 35 percent "moderate" or worse.

**MEDIUM:** 50 percent or more are mild or worse, but less than 35 percent are "moderate" or worse.

**RATHER MARKED:** 35 percent or more, but less than 50 percent are "moderate" or worse, but less than 35 percent are "moderately severe" or worse.

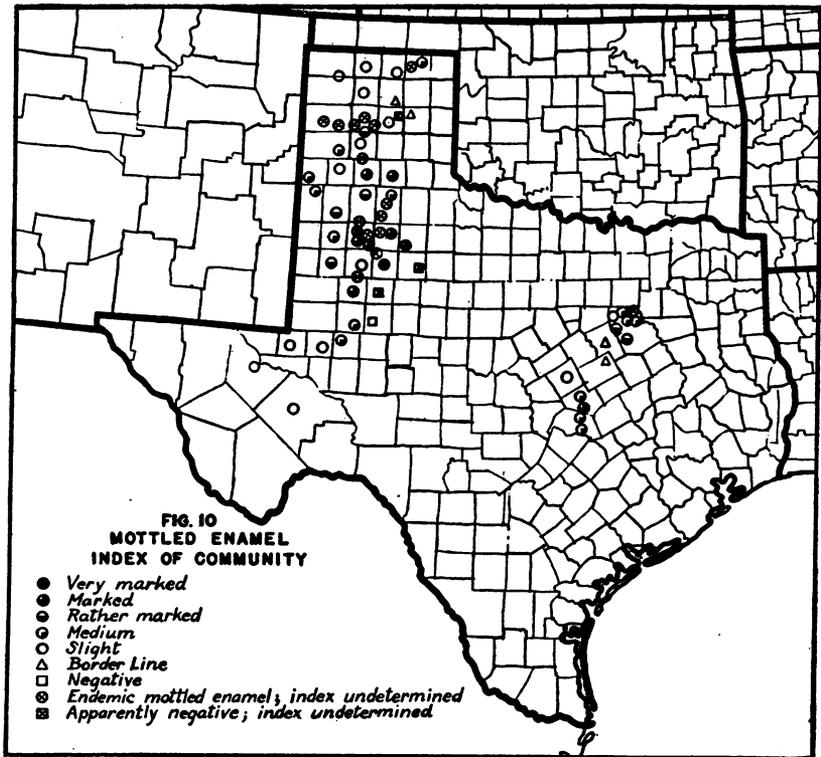
**MARKED:** 50 percent or more are "moderate" or worse, but less than 35 percent are "moderately severe" or worse.

**VERY MARKED:** 35 percent or more are classified as "moderately severe" or worse.

All children included in a group utilized in the determination of a mottled enamel index of a community refer to children whose time of risk of exposure had been constant, meaning that the children were born in the community, had lived there all their lives (short vacations totaling less than 30 days in one calendar year excepted), and had always used the municipal or common water supply for cooking and drinking purposes. In certain west Texas communities the mottled enamel index could be determined only tentatively at this time. The reason for a tentative index will be made apparent in the section dealing with the factor of population influx.

FACTOR OF POPULATION INFLUX

The factor of population changes and its relation to changes of water supply are obviously of paramount importance in mottled enamel investigation. The pertinent facts concerning population movements have a direct bearing on the west Texas survey. There has been a rapid growth and development of west Texas during the period between 1920 and 1930. The marked migration into west Texas during this decade is well illustrated by an examination of the reports of the Bureau of the Census (8). The percentage increase in



population between 1920 and 1930 for the State of Texas was 24.9, while the population of the 37 west Texas counties covered by this report increased from 138,851 in 1920 to 379,881 in 1930, or 173.6 percent.

As a result of the unusual increase in population in west Texas during the period between 1920 and 1930, a large number of children disclosed histories of residence in nonendemic and endemic areas, or of having lived continuously since birth in a community where the municipal water supply had been installed or changed during the life of the child. It was not infrequent to find that smaller cities or

towns had installed municipal water only as late as 6 to 8 years ago; previous to that time the few inhabitants depended on individual windmill wells.

In all of such places the attempt was made to determine whether the municipal water supply was producing mottled enamel by an examination of those children in the fifth and sixth grades who had used the municipal water exclusively for at least the past 6 years. In such groups the examination was limited to the cuspids, bicuspid, and second molar teeth, and the presence or absence of mottled enamel recorded on the basis of these observations. Under such conditions the mottled enamel index given to such communities is necessarily tentative. Each community should be resurveyed 3 or 4 years hence to determine its actual or approximate mottled enamel index.

#### WATER SUPPLIES

In the west Texas phase of the survey, another of us (R. M. D.) obtained all relative data available concerning the municipal supply from the local water superintendent, and collected one or more samples of the supply. When the municipal supply was a composite water from more than one stratum, two or more samples were collected whenever possible. These samples were forwarded to the Texas State Department of Health in whose laboratories the fluoride determinations are being made. The report of the chemical determination of these waters associated with endemic mottled enamel will be made the basis of a separate report. The information included in this report regarding municipal water supplies of the affected communities in the east central Texas area has been obtained by another of the authors (C. C.).

In west Texas there are apparently three strata of water-bearing sands, in general not widely separated in depth. Practically all wells in this region are drilled, and it is customary to refer to drilled wells obtaining water from the first stratum as "shallow," and from the second or third stratum as "deep." Consequently in one county the term "shallow" may be applied to a 300-foot drilled well because water from the second or third stratum is not obtained until a depth of 450 or 500 feet is reached, while in another county, the term "deep" well may be applied to a 125-foot well because the first stratum of water in that particular locality is reached at 80 feet.

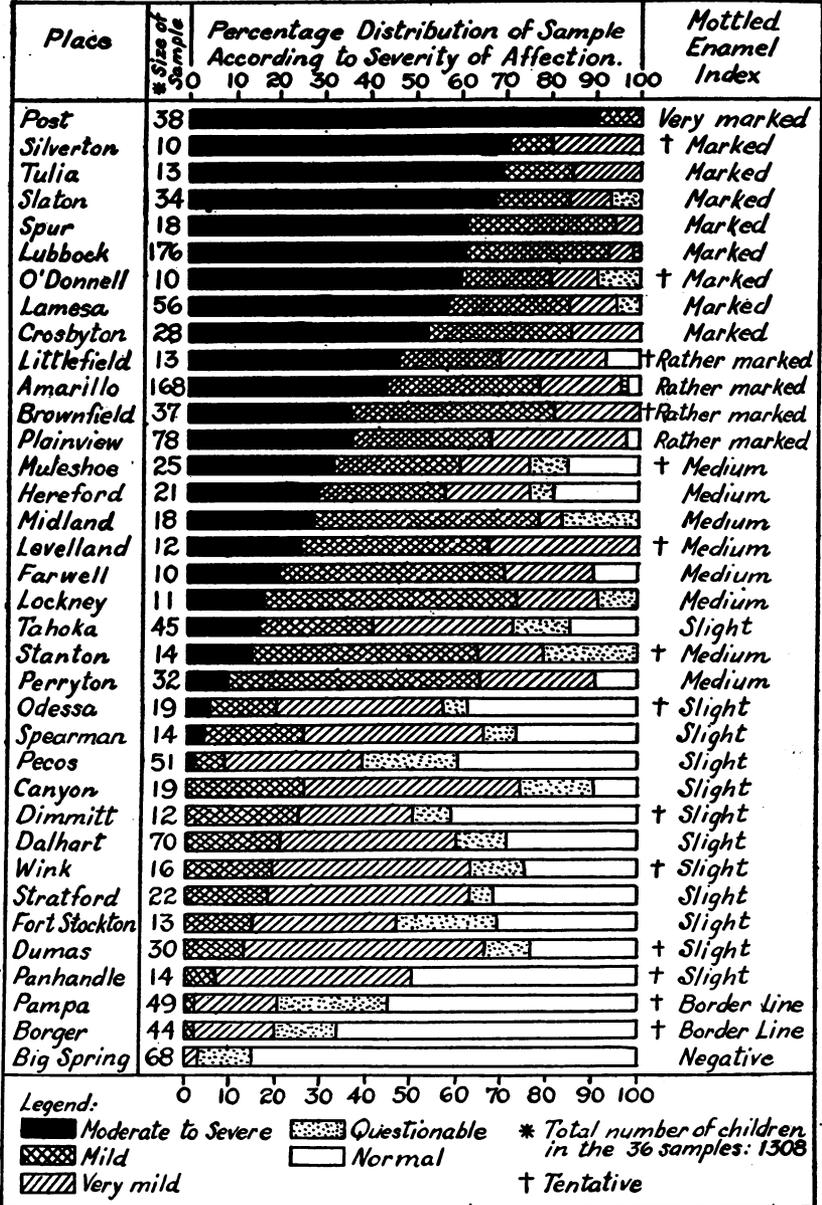
#### SURVEY FINDINGS

The results of this survey are summarized as follows:

Table 1 details the mottled enamel findings and history of common water supplies in certain cities of the Panhandle, west Texas, and

**FIG. 11**  
**SEVERITY OF MOTTLED ENAMEL IN CHILDREN OF CERTAIN SELECTED**  
**PLACES OF THE PANHANDLE AND WEST TEXAS**

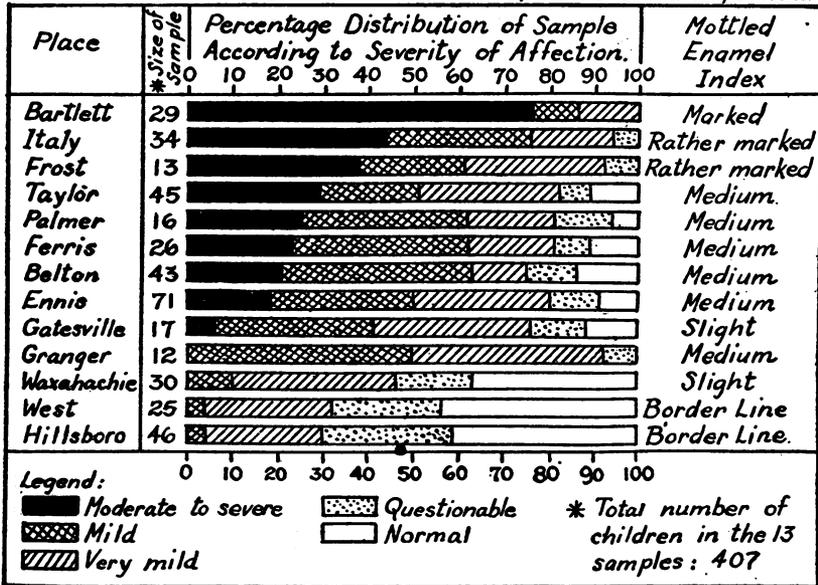
*Children in continuous residence and uninterrupted use of municipal water*



east central Texas. In these cities a sufficient number<sup>1</sup> of children with a history of continuous residence and constant use of the city water were examined to warrant the development of an approximate<sup>2</sup> or tentative mottled enamel index of the community. Figures 11 and 12 illustrate the percentage distribution of that part of the sample having continuous residence and constant use of a common water supply listed according to severity of affection, and they also show either the approximate or tentative mottled enamel index of the community.

**FIG. 12**  
SEVERITY OF MOTTLED ENAMEL IN CHILDREN OF CERTAIN SELECTED PLACES  
OF EAST CENTRAL TEXAS.

*Children in continuous residence and uninterrupted use of municipal water*



In table 2 are listed four small communities possessing municipal water supplies, but where an insufficient number of examinations were made to permit the computation of a mottled-enamel index.

Table 3 summarizes mottled enamel findings in certain communities and rural districts of the Panhandle and west Texas where common water supplies are either not available or, in two instances, not used.

<sup>1</sup> Ordinarily the mottled-enamel index of a community should not be determined unless the group examined consists of 25 or more children with a continuous residence since birth and a constant use of a common water supply. This minimum standard could not be adhered to in all instances in this survey owing to the factor of population changes or a smaller number of children available in the school showing a constant residence and water history.

<sup>2</sup> It should be noted that an "actual mottled enamel index" is not given a community unless all histories as given by the child, with respect to both residence and water supplies, are rechecked and confirmed by an interview with the child's parents.

TABLE 1.—Summary of mottled enamel findings and history of water supply in certain cities of (1) Panhandle and west Texas and (2) east central Texas

1. PANHANDLE AND WEST TEXAS

City and population (census of 1930)	Total number of children ex- amined	Children classified according to mottled enamel diagnosis												History of water supply	Remarks		
		(A) Continuous residence with constant use of city water						(B) Changes in residence and/or water history									
		Normal	Question- able	Very mild	Mild	Moderate	Moderately severe	Severe	Normal	Question- able	Very mild	Mild	Moderate			Moderately severe	Severe
Post (1,668)-----	38	0	0	0	4	19	13	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Present supply in constant use since prior to 1922; obtained from 13 wells 85 feet to 100 feet deep; apparently in first stratum.	Sample represents all children in the fourth, fifth, and sixth grades who used city water continuously. Post is located east of the cap rock, but the wells from which the supply is obtained are 3 to 4 1/4 miles west of Post, and on the cap rock.
Silverton (873)-----	45	0	0	2	1	6	1	0	7	1	8	7	4	0	Obtained from 120 feet (1924) and 150 feet (1928) wells in first stratum, similar to local windmill wells. City supply in general use less 6 years only.	Entire sixth grade examined; "B" also includes some children from immediate rural districts.	
Tulia (2,202)-----	61	0	0	2	2	8	1	0	7	2	12	13	1	0	From North well 168 feet (1922) and South well 60 feet (1925). Apparently first stratum. Most of water supply at present from the South well.	Entire sixth grade examined; "B" also includes children from immediate rural district.	
Slaton (3,876)-----	34	0	2	3	6	19	3	1	(1)	(1)	(1)	(1)	(1)	(1)	From 1922-24 shallow wells first stratum. Since 1924 3 wells, 125, 135, and 210 feet. First 2 take water from first and second strata, third well from all 3 strata.	Sample represents all children of fourth, fifth, and sixth grades who used city water continuously.	
Spur (1,899)-----	24	0	0	1	6	11	0	0	4	0	0	1	0	0	Municipal water supply is obtained from 3 wells, each 44 feet deep. Spur is located east of the cap rock, but is apparently drawing its water from the cap rock aquifer.	Sample under "A" represents all children in fifth and sixth grades with constant history. Four normals under "B" used eastern water exclusively.	
Lubbock (20,520)-----	176	0	2	11	54	77	31	1	(1)	(1)	(1)	(1)	(1)	(1)	Municipal water obtained from 8 drilled wells with standard tests casing the entire depth, and averaging 98 to 100 feet.	Sample represents all white children in fourth, fifth, and sixth grades of public schools whose histories indicated constant use of city water since birth.	

O'Donnell (1,026)-----	27	0	1	1	2	6	0	0	2	1	6	5	2	1	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Lamesa (3,528)-----	56	0	3	6	15	23	9	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Crosbyton (1,250)-----	28	0	0	4	9	14	1	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Littlefield (3,218)-----	84	1	0	3	3	5	1	0	21	6	17	16	11	0	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Amarillo (43,132)-----	533	5	1	30	58	60	12	2	126	15	90	86	42	6	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Brownfield (1,907)-----	37	0	0	7	17	10	3	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Plainview (3,834)-----	78	2	0	24	24	26	2	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Muleshoe (779)-----	72	4	2	4	7	7	1	0	22	2	11	7	3	2	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Hereford (2,456)-----	92	4	1	4	6	4	2	0	11	8	15	16	18	3	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Midland (5,484)-----	18	0	3	1	9	5	0	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Levelland (1,661)-----	77	0	0	4	5	3	0	0	16	8	15	13	12	1	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Farwell (647) ?-----	52	1	0	2	5	2	0	0	20	2	13	5	2	0	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.
Lockney (1,466)-----	30	0	1	2	6	2	0	0	0	0	8	9	2	0	0	0	Obtained from seven 80-foot uncased wells, taking water from first stratum. 5 were drilled in 1928 and 2 in 1929. No common water supply prior to 1928. No common water supply prior to 1928. 90, 140, and 300 feet, respectively. Since 1929, 3 wells 140 feet, taking water from second stratum. From two 280-foot wells drilled in 1918 and 1920 and taking water from the second stratum.

\* None examined.

\* Rand McNally pocket map of Texas, 1934.

"B" includes children, from immediate rural district and "A" sample, all children third, fourth, and fifth grades who used city water past 5 years. Sample represents all children in the third, fourth, and fifth grades who used city water continuously since birth.

Do.

"A" sample represents all children in fifth and sixth grades who used city water continuously since installation.

Sample consists of entire fourth, fifth, and sixth grades in 3 white and 1 colored public schools.

Sample represents all children in fourth, fifth, and sixth grades who used city water continuously since 1925.

Sample represents children in fifth, sixth, seventh, and eighth grades, who used municipal water continuously since birth.

"A" sample represents all children in fifth, sixth, and seventh grades, who used city water continuously for past 6 years.

"B" sample includes many children using individual windmill wells, both city and immediate rural district.

Sample represents all children in fifth and sixth grades using city water continuously since birth.

"A" sample represents all children in fifth and sixth grades who used city water for past 6 years.

"A" sample represents all children in fourth, fifth, sixth, and seventh grades who used city water continuously.

"B" sample represents children using windmill well water continuously from birth in Lockney and immediate rural district.

TABLE 1.—Summary of mottled enamel findings and history of water supply in certain cities of (1) Panhandle and west Texas and (2) east central Texas—Continued

1. PANHANDLE AND WEST TEXAS—Continued

City and population (census of 1930)	Total number of children ex- amined	Children classified according to mottled enamel diagnosis										History of water supply	Remarks				
		(A) Continuous residence with constant use of city water					(B) Changes in residence and/or water history										
		Normal	Question- able	Very mild	Mild	Moderate	Moderately severe	Severe	Normal	Question- able	Very mild			Mild	Moderate	Moderately severe	Severe
Tahoka (1,620).....	68	7	6	14	11	7	0	0	2	2	0	3	5	1	0	From 11 wells 80 to 100 feet deep obtaining water from first stratum. First well drilled 1924; subsequent wells added as needed; 9 wells are "gravel backed." From 3 wells, 2 drilled 1927, 1 in 1930, each 135 feet; first stratum cased off. No common water supply prior to 1927.	"A" sample, all children in second, third, fourth, fifth, and sixth grades using city water continuously since birth. "B" sam- ple children from immediate rural district. Sample consists of children in fourth, fifth, and sixth grades using municipal water continuously since 1927. Entire fifth and sixth grades, Perryton and rural school district.
Stanton (1,384).....	14	0	3	2	7	2	0	0	(1)	(1)	(1)	(1)	(1)	(1)	0	From two 400-foot "gravel backed" wells installed 1927. City water is a com- posite from all 3 strata. Municipal supply in use since 1923.	
Perryton (2,824).....	137	3	0	8	18	3	0	0	38	9	33	21	4	0	0	From six 140-foot wells; 5 drilled 1928, 1 in 1933. No city water prior to 1928.	
Odessa (2,407).....	32	7	1	7	3	1	0	0	7	1	1	3	1	0	0	From two 350-foot wells drilled 1924 and 1927. Stratum from which water is obtained is unknown.	Both samples from third and fourth grades, "A" used city water con- stantly past 6 years. "B" used indi- vidual wells constantly since birth.
Spearman (1,680).....	107	2	1	5	5	1	0	0	48	8	27	9	1	0	0	All of fifth and sixth grades examined, Spearman and rural school district.	
Pecos (3,304).....	51	20	11	16	3	1	0	0	(1)	(1)	(1)	(1)	(1)	(1)	0	Sample consists of all children in third, fifth, sixth, and seventh grades using city water exclusively since birth.	
Canyon (2,821).....	89	2	3	9	5	0	0	0	15	6	15	16	16	2	0	In sample "B" there were 14 children from immediate rural district who always used water from individual windmill wells. They show a more severe type of mottled enamel than those using Canyon city water.	
Dimmitt (829).....	53	5	1	3	3	0	0	0	12	6	6	10	5	2	0	"A" sample represents all children in fifth and sixth grades using city water constantly for past 6 years. In sample "B" there were 9 children from imme-	

diate rural district who from birth continuously used water from individual wells. All showed a more severe type of mottled enamel than those using Dimmitt city water. Examinations were made of children in fourth, fifth, and sixth grades.

Sample taken from fourth grade, none over 10 years of age and had used city water for at least past 6 years.

Examinations included all children of fourth, fifth, and sixth grades.

Sample represents all children in fourth fifth and sixth grades who used city water continuously.

All children in the fourth and fifth grades were examined.

All children in sixth grade examined. "A" sample represents children using city water for the past 6 years.

All children in sixth grade examined. "A" sample represents children using city water for the past 6 years or longer.

All of fifth and sixth grades examined. "A" sample represents children using city water for the past 6 years.

Sample consists of all children in fifth and sixth grades whose history indicated constant residence and continuous use of city water.

Dalhart (4,691).....	248	20	8	27	15	0	0	0	100	8	43	22	5	0	0	0	0	From 2 wells 340 feet deep, drilled 1923. Prior 1923 water obtained from wells of similar depth.
Wink (3,963).....	16	4	2	7	3	0	0	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	From 5 wells 220 feet deep, drilled 1927; first stratum is cased off. At present only 1 well is being used. No common water supply prior 1927.
Stratford (873).....	76	7	1	10	4	0	0	0	27	10	10	6	1	0	0	0	0	From the 302-foot well, drilled 1930, and owned by the West Texas Utility Co. No information obtained concerning previous municipal supply.
Fort Stockton (2,695).....	13	4	3	4	2	0	0	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	From 175-foot well, drilled 1927. Between 1923-30 water was obtained from 2 wells 306 and 365 feet. These wells were abandoned in 1930. Between 1927-30 the supply was composite of all wells.
Dumas (700).....	86	7	3	16	4	0	0	0	39	4	9	3	1	0	0	0	0	From 2 wells 530 and 550 feet, installed in 1930. No information regarding stratum from which water is obtained.
Panhandle (2,035).....	42	7	0	6	1	0	0	0	10	5	8	5	0	0	0	0	0	From 2 wells each 550 feet, installed 1927. No information on stratum from which water is obtained. No common water supply prior 1927.
Pampa (10,470).....	117	27	12	9	1	0	0	0	46	9	10	3	0	0	0	0	0	Present supply from 3 wells, 384 feet, cased entire depth, and taking water from third stratum. There are 6 other wells not being used at present.
Borger (6,532).....	124	29	6	8	1	0	0	0	57	10	10	3	0	0	0	0	0	From wells 240 to 500 feet, located 18 miles south in Carson County (Plain Station) and installed 1928. No common water supply prior 1928.
Big Spring (13,735).....	68	58	8	2	0	0	0	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Municipal supply consists of 23 wells. One-third of supply from 13 wells 280 feet, drilled in 1923. Two-thirds of supply from 8 wells 280 to 300 feet, drilled 1927. Between 1894-1923 all municipal water from "Old Park" supply, which was supplemented until 1927 with 1923 group of wells. Between 1927-33 "Old Park" supply shut down. Between November 1933 and May 1934, 1927 group of wells also shut down. Wells located 2, 6, and 9 miles, respectively, south of Big Spring.
<b>Total</b> .....	<b>2,893</b>	<b>226</b>	<b>85</b>	<b>264</b>	<b>325</b>	<b>322</b>	<b>80</b>	<b>6</b>	<b>637</b>	<b>123</b>	<b>387</b>	<b>283</b>	<b>152</b>	<b>23</b>	<b>0</b>	<b>0</b>	<b>0</b>	

\* Rand McNally pocket map of Texas, 1934.

†None examined.

TABLE 1.—Summary of mottled enamel findings and history of water supply in certain cities of (1) Panhandle and west Texas and (2) east central Texas—Continued

2. EAST CENTRAL TEXAS

City and population (census of 1930)	Total number of children ex- amined	Children classified according to mottled enamel diagnosis										History of water supply	Remarks				
		(A) Continuous residence with constant use of city water					(B) Changes in residence and/or water history										
		Normal	Question- able	Very mild	Mild	Moderate	Moderately severe	Severe	Normal	Question- able	Very mild			Mild	Moderate	Moderately severe	Severe
Bartlett (1,873).....	29	0	0	4	3	18	3	1	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Sample consists of all children in fifth, sixth, and seventh grades with a continuous residence since birth and constant use of city water.
Italy (1,230).....	34	0	2	6	11	10	5	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Sample consists of all children in fourth, fifth, sixth, and seventh grades who comply with "A" classification.
Frost (748).....	13	0	1	4	3	5	0	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Sample consists of all children in fifth, sixth, and seventh grades who comply with "A" classification.
Taylor (7,463).....	45	5	8	14	10	8	5	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Sample consists of all children in the sixth grade coming under "A."
Palmer (738).....	16	1	2	3	6	2	2	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Sample consists of all children in the third, fourth, and fifth grades who comply with "A" classification.
Ferris (1,468).....	26	3	2	5	10	5	1	0	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Sample consists of all children in the fourth, fifth, and sixth grades who comply with "A" classification. During the examination in Ferris, 5 pupils who had always lived in the nearby community of India, but who attended school in Ferris, were observed. All 5 showed mottled enamel moderate in severity. These 5 are not included in the Ferris totals.



**TABLE 2.**—*Summary of mottled enamel findings in certain communities of the Panhandle and west Texas with a common water supply but where an insufficient number of examinations precluded the computation of a mottled enamel index*

City and population (census of 1930)	Children classified according to mottled enamel diagnosis												History of water supply	Remarks					
	Total number of children examined	(A) Continuous residence with constant use of city water						(B) Changes in residence and/or water history											
		Normal	Questionable	Very mild	Mild	Moderate	Severe	Normal	Questionable	Very mild	Mild	Moderate			Severe				
Lorenzo (739).....	25	0	0	1	4	2	0	0	0	0	0	2	4	4	3	1	0	Municipal water supply obtained from one 280-foot well drilled in 1928. First stratum cased off.	Sample "A" represents all children in the third and fourth grades who used city water for the past 6 years. Sample "B" represents children who have used continuingly water from local or nearby rural windmill wells.
Idalou (538).....	33	0	0	1	2	3	2	0	1	5	6	12	0	0	0	0	0	From 1 well, drilled in 1925, 136 feet. First stratum cased off and city supply obtained from second stratum.	Sample "A" represents children from the second, third, fourth, and fifth grades. Sample "B" represents children who have used continuingly water from local or nearby rural windmill wells.
White Deer (1,010).....	28	6	0	0	0	0	0	0	18	0	3	1	0	0	0	0	0	From one 395-foot well, drilled in 1926, cased entire depth and obtaining water from the "bottom" stratum only.	Sample "A" represents all children of the sixth grade coming under that classification. High percentage of children showing normal calcification warrants a detailed epidemiological survey.
Vega (519).....	37	0	0	1	3	2	0	0	10	2	8	9	2	0	0	0	0	From 2 wells, one 240-foot, drilled in 1921, and one 395-foot, drilled in 1928. The latter supplies practically all the water.	Sample "A" represents all children from the sixth and seventh grades examined. "B" includes children from immediate rural districts.
Total.....	123	6	0	3	9	7	2	0	31	7	20	20	17	1	0	0	0		

TABLE 3.—*Summary of mottled-enamel findings in certain communities of the Panhandle and west Texas with no common water supply. (See two exceptions under "Remarks.")*

City and population (census of 1930)	COMMUNITIES WHERE WATER FROM INDIVIDUAL WINDMILL WELLS IS USED						History of water supply and remarks		
	Total num- ber of chil- dren exam- ined	Children classified according to mottled enamel diagnosis							
		Nor- mal	Ques- tion- able	Very mild	Mild	Mod- erate		Mod- erately severe	Severe
Southland (400) <sup>1</sup> .....	21	0	0	0	4	12	5	0	Sample represents all children in fourth and fifth grades who stated they had either lived in Southland or immediate rural school district all their lives and had always used water from windmill wells. Individual windmill wells in this particular area are approximately 100 to 125 feet in depth.
Two Floyd County rural districts.....	23	0	2	6	7	7	1	0	Examinations were made in 2 rural schools, one 4 miles south of Lockney, the other 12 miles west and 2 miles south of Floydada. 14 of the children stated they had always used water from individual windmill wells located within the borders of their respective school districts.
Three Potter County rural districts.....	98	22	8	16	35	16	1	0	Examinations were made in 3 rural schools, located at Bushland, River Road, and Highland Park, respectively, 10 miles west, 6 miles north, and 10 miles east of Amarillo. Sample contains children with a history of continuous residence in the district and others born elsewhere. Water is obtained from individual windmill wells apparently from the first stratum.
Happy (724) <sup>1</sup> .....	29	5	6	7	5	5	1	0	Although Happy has a municipal water supply installed in 1928, it was not possible to find more than 3 children in the grades examined who had used the city water for at least the past 5 years, many of the inhabitants continuing to use windmill wells. Most of the sample represents children from the immediate rural districts.
Monroe (50) <sup>1</sup> .....	17	3	6	6	2	0	0	0	Children in this sample stated they had lived continuously either in Monroe or the immediate rural district and had used water from individual windmill wells.
Abernathy (858) <sup>1</sup> .....	34	9	12	7	4	1	1	0	There is no municipal water supply in Abernathy and sample represents children who stated they had always lived either in Abernathy or in the school district, and who had always used water from individual windmill wells, which vary from 118 to 130 feet in depth.
Wildorado (105) <sup>1</sup> .....	30	6	10	3	10	1	0	0	This sample represents children from the third, fourth, fifth, sixth, and seventh grades and contains many with both continuous and variable histories. Individual windmill wells are approximately 150 feet deep.
Farmsworth (25) <sup>1</sup> .....	20	7	2	4	4	3	0	0	Sample represents children from the fourth, fifth, sixth, and seventh grades and includes children from both Farmsworth and the immediate rural district. Water histories in this group vary. Water is obtained from individual windmill wells.

<sup>1</sup> Rand McNally pocket map of Texas, 1934.

**TABLE 3.**—*Summary of mottled-enamel findings in certain communities of the Panhandle and west Texas with no common water supply. (See two exceptions under "Remarks")—Continued*

**COMMUNITIES WHERE WATER FROM CISTERNS IS USED FOR DOMESTIC PURPOSES**

City and population (census of 1930)	Total number of children examined	Children classified according to mottled enamel diagnosis					History of water supply and remarks	
		Normal	Questionable	Very mild	Mild	Mod-erately severe		Severe
Jayton (623).....	6	6	0	0	0	0	0	The 6 examined represent children who had lived in Jayton all their lives and had used continuously water from cisterns for domestic purposes. Afternoon school dismissal of the pupils prevented examination of any additional number. The city has a common water supply, but it is of a type which obviates its use for domestic purposes, and the inhabitants of this town use cistern water for cooking and drinking. Sample represents children from the fourth, fifth, and sixth grades with a history of continuous residence in Gall or nearby rural districts for the major part of their lives. The 1 case of mottled enamel had lived at O'Donnell, an endemic area, from birth to 2 years of age. Water for domestic purposes is obtained from cisterns and occasionally surface sources.
Gall (100).....	17	15	1	1	0	0	0	
<b>Total</b> .....	295	73	47	50	71	45	9	

## DISCUSSION

This survey presents definite evidence that the Panhandle-west Texas region constitutes the largest mottled-enamel area in the United States. There is no doubt that a detailed survey would disclose many additional smaller communities and rural districts where mottled enamel is endemic. Since this territory is generally affected through all gradations from a slight to a marked degree, the influence of the causative factor of mottled enamel is operative over a vast area, with the result that many thousands of the inhabitants are affected.

The area known as the "Llano Estacado" is apparently the most severely affected. From observations made during this survey, the region of the greatest severity centers in and around the city of Lubbock and extends in an easterly direction toward Spur and Post, northward toward Plainview and Amarillo, and southward toward Lamesa. The fact that such large cities as Amarillo, Lubbock, and Plainview are located in the region of the greatest severity makes this a serious problem of keen public-health interest. Although definite manifestations of endemic mottled enamel are readily demonstrable in communities located north of the Canadian River and south of the eastward prolongation of the southern boundary of the State of New Mexico (Edwards Plateau), the type of mottled enamel being developed in these two regions is markedly less severe, the community index generally being slight.

Examination of numerous children, who spent the first 5 or 6 years of their lives in eastern New Mexico, indicates definitely that mottled enamel comparable to that found in west Texas is likewise being developed in eastern New Mexico.

The east central Texas area should be further studied and the boundaries of endemicity determined. Endemic mottled enamel has now been definitely demonstrated in numerous localities between Austin and Dallas. In certain communities, such as Bartlett, Italy, and Frost, a type of mottled enamel is being produced that is comparable in severity with some of the more seriously affected cities and towns of west Texas.

## SUMMARY

## (A) THE PANHANDLE AND WEST TEXAS

1. The Panhandle-west Texas region constitutes the largest mottled-enamel area in the United States. As a result of the unusual population influx between 1920 and 1930, the number of children affected has correspondingly increased.

2. Of 53 communities surveyed in 37 counties, only 6 could be classified as "negative" or "border line."

3. The fact that the municipal water supplies of such large cities as Amarillo, Lubbock, and Plainview contain the causative factor of

mottled enamel in sufficient concentration to produce this hypoplasia in a high percentage of their children has developed an acute and urgent public health problem.

(B) EAST CENTRAL TEXAS

4. An endemic area of unknown size is reported in east central Texas between Austin and Dallas.

5. Of 13 communities surveyed, only 2 were classified as "border line" and none was classified as "negative."

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## OBSERVATIONS ON THE EPIDEMIOLOGY OF LEPROSY IN HAWAII

A study<sup>1</sup> of some of the epidemiological features of leprosy was undertaken in Hawaii because statistics of the certification of leprous persons and of the general population have been recorded for many years, and the modern development of this insularly isolated community seemed to offer a unique opportunity for such researches. Data have been collected and analyzed and investigations have been made in an effort to contribute to the knowledge of the following aspects of the subject: The trend of the local prevalence or incidence; probable age of infection; ratio of the affection in the sexes; degree of communicability; susceptibility of races; relation of contact with infection to the development of the disease; and the correlation of the economic and environmental status of the affected people with the prevalence of the disease among them.

<sup>1</sup> Leprosy: Observations on its epidemiology in Hawaii. By N. E. Wayson and Theodore R. Rhea. *Public Health Bulletin No. 212*.

The analyses and deductions are based on the records of admissions to segregation during the period of the last 40 years, upon researches into the occurrence of the disease in 400 to 500 family groups, and upon detailed field investigations of the immediate environmental circumstances of approximately 100 of these families.

The average number and rate of annual admissions from both the general and specific populations have declined rather steadily and continuously. In the decade 1890 to 1900 the annual admission rate per thousand among the native Hawaiians was approximately 3.5, while in the quinquennium 1926 to 1930 it was less than 1 per thousand. This specific group lends itself to more accurate study because its total number has not been directly affected by immigration or emigration during this period. The decrease noted has been proportionately greater in the younger age groups, in which formerly the higher admission rates had prevailed; and it is believed that the declining rate of all admissions reflects a diminished incidence of the disease. This suggested decline in the incidence seems to be consequent to, or at least coincidental with, general biological and environmental influences which are put in evidence by falling death rates from other causes rather than as a result of specific control measures. During the past 40 years and just prior to the beginning of that period, there were importations of relatively large numbers of people from localities in which leprosy has been endemic for a long time. These immigrations have directly influenced the racial composition of the population and have probably brought about other biological changes indirectly. It is found that the proportionate distribution of the cases of leprosy among the different races has changed, so that in later years approximately 40 percent of the admissions have come from among the people more recently imported, whereas formerly 90 percent of admissions were of the native people.

The incidence of the disease is somewhat higher in certain racial groups, but no evidence is found of a definite racial susceptibility and the disproportions may apparently be attributed with reason to environmental factors which obtain in the different groups.

Inquiries into the frequency of leprosy within family groups in Hawaii reveal the fact that it is readily communicable and that the percentage of those affected in such groups is often greater than that which was found to occur in clinical pulmonary tuberculosis among certain families studied in the United States. Thus, in a total of 996 members of 122 families, in each of which there was more than 1 child, 302 cases of leprosy were admitted during the past 20 years. This represents more than 30 percent of the total family membership. From 14 of these families in which there were 4 or more children 43 percent of the 137 family members were admitted.

Children who are exposed to leprosy when they are younger than 15 years of age are found to be affected more frequently than those individuals who are older when exposed; and the readiness with which they or others develop the disease seems to be influenced by their age at the time of exposure, the period of time through which the exposure prevails, and the intimacy of the exposure. These deductions are supported by the facts that, among 71 families from which a parent or child was admitted with leprosy during the past 15 years, there were 72 children of the age of 0-4 years remaining after the original case was admitted, and 44.4 percent of those children remaining were subsequently admitted; of 64 children of the age of 5-9 years remaining, 32.8 percent were admitted subsequently; of 50 children of the age of 10-14 years remaining, 22 percent were subsequently admitted; and of 27 children of the age of 15-19 years remaining, 11.1 percent were subsequently admitted. After reviewing the statistics of all admissions and the clinical experiences in Hawaii, it appears probable that 40 percent or more of those who develop the disease were infected before reaching 15 years of age.

The rates of admission point to a ratio of infection of about 1 female to 1.5 males.

The incidence of leprosy is higher in the rural sections than in the urban districts; and in the former locations a lower average economic, sanitary, and dietary status prevails among the affected families and a greater frequency of contact with cases occurs within them.

The average economic status of approximately 100 families in which leprosy has occurred is found to be low when measured by local relief standards, and their average dietary is chiefly that of carbohydrates, is low in milk and meat proteins and butter fat, and seemingly low in calcium and vitamins B and C, when comparisons are made with standards regarded as adequate in Hawaii and in continental United States. No direct correlation, however, between the rate of leprosy and these conditions has been determined among this group of families.

### DEATHS DURING WEEK ENDED MAR. 1935

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Mar. 9, 1935	Corresponding week, 1934
<b>Data from 86 large cities of the United States:</b>		
Total deaths.....	9,090	9,451
Deaths per 1,000 population, annual basis.....	12.7	13.2
Deaths under 1 year of age.....	655	687
Deaths under 1 year of age per 1,000 estimated live births.....	60	64
Deaths per 1,000 population, annual basis, first 10 weeks of year.....	12.9	12.7
<b>Data from industrial insurance companies:</b>		
Policies in force.....	67,519,370	67,571,251
Number of death claims.....	15,131	15,707
Death claims per 1,000 policies in force, annual rate.....	11.7	12.1
Death claims per 1,000 policies, first 10 weeks of year, annual rate.....	10.9	11.0

# PREVALENCE OF DISEASE

*No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring*

## UNITED STATES

### CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended Mar. 16, 1935, and Mar. 17, 1934

*Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Mar. 16, 1935, and Mar. 17, 1934*

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934
<b>New England States:</b>								
Maine.....	1		15	1		30	0	0
New Hampshire.....					14	223	0	0
Vermont.....		1			1	54	0	0
Massachusetts.....	4	13			338	2,003	2	0
Rhode Island.....	2				64	5	0	0
Connecticut.....		6	9	15	878	38	0	1
<b>Middle Atlantic States:</b>								
New York.....	25	35	112	129	2,627	1,223	17	2
New Jersey.....	20	13	25	13	1,106	514	2	3
Pennsylvania.....	51	59			5,234	3,697	3	2
<b>East North Central States:</b>								
Ohio.....	60	38	149	144	1,148	1,384	13	2
Indiana.....	11	22	20	67	453	435	0	1
Illinois.....	61	28	70	37	3,202	1,419	25	4
Michigan.....	15	10	5	5	3,447	86	1	1
Wisconsin.....	6	7	77	55	2,068	1,307	5	2
<b>West North Central States:</b>								
Minnesota.....	1	5		2	1,599	224	3	0
Iowa.....	10	6	46	7	1,305	160	0	1
Missouri.....	29	48	172	163	892	1,010	18	1
North Dakota.....	2	10	3	29	170	173	0	1
South Dakota.....	8	2		6	56	478	0	0
Nebraska.....	5	3		9	660	257	4	0
Kansas.....	7	15	14	1	1,379	255	3	0
<b>South Atlantic States:</b>								
Delaware.....		3			8	181	0	0
Maryland.....	4	10	34	25	59	776	5	0
District of Columbia.....	6	8	2		49	606	9	0
Virginia.....	28	21			1,081	1,697	6	7
West Virginia.....	19	14	254	55	506	45	8	1
North Carolina.....	15	16	55	61	699	3,369	2	1
South Carolina.....	2	17	334	757	46	572	1	0
Georgia.....	11	11	225			1,490	0	1
Florida.....	4	2	29	7	100	235	1	0

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Mar. 16, 1935, and Mar. 17, 1934.—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934
<b>East South Central States:</b>								
Kentucky.....	10	25	78	69	605	481	2	1
Tennessee.....	15	12	226	161	115	1,425	5	5
Alabama <sup>1</sup> .....	10	9	303	125	373	832	2	1
Mississippi <sup>2</sup> .....	1	8					1	0
<b>West South Central States:</b>								
Arkansas.....	3	3	106	35	37	374	0	0
Louisiana <sup>3</sup> .....	26	26	18	8	241	293	0	1
Oklahoma <sup>4</sup> .....	4	10	198	78	278	1,025	5	1
Texas <sup>5</sup> .....	46	113	737	652	155	3,106	4	6
<b>Mountain States:</b>								
Montana.....	8	1	145		273	18	1	0
Idaho.....	5	5			70	74	0	0
Wyoming.....	1				100	54	0	0
Colorado.....		5			893	214	0	0
New Mexico.....	7	5	26	2	35	124	3	0
Arizona.....	1		53	31	38	55	2	0
Utah <sup>2</sup> .....					19	608	0	0
<b>Pacific States:</b>								
Washington.....	4	2	1		221	155	0	0
Oregon.....		3	83	87	168	70	2	0
California.....	38	26	215	48	685	1,363	4	3
<b>Total.....</b>	<b>579</b>	<b>676</b>	<b>3,744</b>	<b>2,764</b>	<b>33,695</b>	<b>34,217</b>	<b>159</b>	<b>49</b>

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934
<b>New England States:</b>								
Maine.....	0	0	15	25	0	0	2	1
New Hampshire.....	0	0	20	12	0	0	0	0
Vermont.....	0	0	20	18	0	0	0	0
Massachusetts.....	0	0	277	275	0	0	1	1
Rhode Island.....	0	0	22	14	0	0	0	0
Connecticut.....	0	0	95	92	0	0	0	0
<b>Middle Atlantic States:</b>								
New York.....	0	1	1,102	902	0	0	7	10
New Jersey.....	0	0	190	266	0	0	5	5
Pennsylvania.....	0	0	643	834	0	0	5	9
<b>East North Central States:</b>								
Ohio.....	0	1	1,034	978	0	0	1	2
Indiana.....	0	1	212	229	0	2	0	0
Illinois.....	1	1	1,227	663	1	3	12	0
Michigan.....	0	0	427	876	0	11	0	5
Wisconsin.....	2	1	523	277	26	35	1	0
<b>West North Central States:</b>								
Minnesota.....	1	0	187	69	13	3	0	0
Iowa.....	0	0	83	86	0	11	1	0
Missouri.....	1	0	87	125	4	15	1	1
North Dakota.....	0	2	105	41	0	4	1	0
South Dakota.....	0	0	10	13	0	4	0	0
Nebraska.....	1	0	57	28	41	4	1	5
Kansas.....	0	0	84	111	8	3	0	1
<b>South Atlantic States:</b>								
Delaware.....	0	0	27	19	0	0	0	0
Maryland <sup>2</sup> .....	0	0	95	79	0	0	0	3
District of Columbia.....	1	0	100	14	0	0	0	0
Virginia.....	0	1	85	45	0	0	3	2
West Virginia.....	0	0	126	58	0	0	3	1
North Carolina.....	1	1	33	42	0	0	0	3
South Carolina.....	0	0	4	5	0	0	0	3
Georgia <sup>3</sup> .....	0	1	10	6	2	0	0	5
Florida.....	0	1	9	6	0	0	6	4

See footnotes at end of table.

*Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Mar. 16, 1935, and Mar. 17, 1934.—Continued*

Division and State	Pollomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934	Week ended Mar. 16, 1935	Week ended Mar. 17, 1934
<b>East South Central States:</b>								
Kentucky.....	1	1	24	108	0	0	3	3
Tennessee.....	0	0	33	29	0	2	2	4
Alabama <sup>1</sup> .....	0	1	13	12	2	0	1	3
Mississippi <sup>2</sup> .....	0	0	6	25	1	0	2	8
<b>West South Central States:</b>								
Arkansas.....	0	0	6	8	1	2	0	1
Louisiana <sup>3</sup> .....	1	0	30	24	1	5	8	10
Oklahoma <sup>4</sup> .....	0	0	18	10	0	3	2	5
Texas <sup>5</sup> .....	1	0	84	133	7	35	12	10
<b>Mountain States:</b>								
Montana.....	0	0	11	18	0	0	0	2
Idaho.....	0	0	5	2	0	3	0	0
Wyoming.....	0	0	8	7	7	0	0	0
Colorado.....	0	0	307	26	6	15	1	0
New Mexico.....	0	0	7	20	4	2	2	3
Arizona.....	0	0	24	20	1	0	0	0
Utah <sup>1</sup> .....	0	0	94	6	7	0	0	0
<b>Pacific States:</b>								
Washington.....	0	1	52	60	25	11	2	1
Oregon.....	1	0	66	31	4	10	3	2
California.....	9	6	269	207	8	17	4	5
<b>Total.....</b>	<b>21</b>	<b>20</b>	<b>7,966</b>	<b>6,893</b>	<b>169</b>	<b>200</b>	<b>92</b>	<b>118</b>

<sup>1</sup> New York City only.

<sup>2</sup> Week ended earlier than Saturday.

<sup>3</sup> Typhus fever, week ended Mar. 16, 1935, 10 cases, as follows: Georgia, 1; Alabama, 2; Louisiana, 1; Texas, 6.

<sup>4</sup> Exclusive of Oklahoma City and Tulsa.

### SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
<i>February 1935</i>										
Connecticut.....	2	16	103	-----	2,633	-----	0	221	0	3
Delaware.....		6	8	-----	6	-----	0	74	1	0
District of Columbia.....	27	67	18	-----	39	-----	2	150	0	5
Indiana.....	12	162	407	-----	2,107	-----	2	1,069	14	5
Iowa.....	10	33	435	-----	5,640	-----	3	372	12	6
Minnesota.....	8	40	107	-----	8,924	-----	1	552	17	1
Nebraska.....	21	35	37	-----	1,827	-----	3	154	165	0
New Jersey.....	6	65	98	-----	2,113	-----	1	581	0	3
New Mexico.....	4	28	352	-----	81	-----	1	79	3	12
North Carolina.....	13	75	883	-----	3,058	5	1	135	0	5
South Carolina.....	6	95	3,575	191	138	45	1	24	0	6
Tennessee.....	39	64	1,654	22	148	4	2	151	1	8

Summary of monthly reports from States—Continued

February 1935		February 1935—Continued		February 1935—Continued	
Actinomycosis:	Cases	German measles—Con.	Cases	Septic sore throat:	Cases
South Carolina.....	1	New Jersey.....	594	Connecticut.....	15
Conjunctivitis:		New Mexico.....	293	Iowa.....	4
Connecticut.....	1	North Carolina.....	25	Minnesota.....	3
New Mexico.....	2	Tennessee.....	4	Nebraska.....	7
Chicken pox:		Hookworm disease:		New Mexico.....	3
Connecticut.....	622	South Carolina.....	31	North Carolina.....	8
Delaware.....	45	Impetigo contagiosa:		Tennessee.....	13
District of Columbia.....	240	Iowa.....	2	Trachoma:	
Indiana.....	528	Tennessee.....	2	New Mexico.....	1
Iowa.....	196	Mumps:		North Carolina.....	1
Minnesota.....	326	Connecticut.....	220	Trichinosis:	
Nebraska.....	222	Delaware.....	28	Iowa.....	1
New Jersey.....	1,753	Indiana.....	69	Minnesota.....	1
New Mexico.....	114	Iowa.....	776	Tularaemia:	
North Carolina.....	417	Nebraska.....	225	North Carolina.....	3
South Carolina.....	51	New Jersey.....	417	Tennessee.....	4
Tennessee.....	153	New Mexico.....	58	Typhus fever:	
Dengue:		South Carolina.....	287	North Carolina.....	2
South Carolina.....	4	Tennessee.....	84	South Carolina.....	4
Diarrhea:		Ophthalmia neonatorum:		Undulant fever:	
South Carolina.....	138	Minnesota.....	1	Connecticut.....	3
Dysentery:		New Jersey.....	6	Delaware.....	4
Connecticut (amoebic).....	1	South Carolina.....	9	Iowa.....	5
Connecticut (bacillary).....	4	Tennessee.....	5	Minnesota.....	5
Minnesota (amoebic).....	8	Paratyphoid fever:		New Jersey.....	1
New Jersey (amoebic).....	2	Connecticut.....	1	North Carolina.....	2
New Mexico (unspeci- fied).....	9	New Jersey.....	2	South Carolina.....	2
New Mexico (bacillary) Tennessee.....	8 5	Tennessee.....	1	Tennessee.....	1
Epidemic encephalitis:		Puerperal septicemia:		Vincent's infection:	
Indiana.....	1	New Mexico.....	6	Tennessee.....	5
Iowa.....	1	Tennessee.....	2	Whooping cough:	
Minnesota.....	2	Rabies in animals:		Connecticut.....	279
New Jersey.....	9	Indiana.....	38	Delaware.....	22
South Carolina.....	3	New Jersey.....	4	District of Columbia.....	10
Food poisoning:		South Carolina.....	62	Indiana.....	150
New Mexico.....	1	Rabies in man:		Iowa.....	47
German measles:		Indiana.....	1	Minnesota.....	162
Connecticut.....	124	Scabies:		Nebraska.....	23
Delaware.....	2	Tennessee.....	16	New Jersey.....	1,440
Iowa.....	37			New Mexico.....	87
				North Carolina.....	1,246
				South Carolina.....	139
				Tennessee.....	228

CASES OF VENEREAL DISEASES REPORTED FOR JANUARY 1935

This statement is published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State health officers. They are preliminary and are, therefore, subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

State	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama <sup>1</sup> .....				
Arizona.....	42	.83	133	2.94
Arkansas.....	442	2.36	128	.68
California.....	1,640	2.71	1,388	2.29
Colorado <sup>1</sup> .....				
Connecticut.....	234	1.42	154	.94
Delaware.....	197	8.17	32	1.33
District of Columbia.....	151	3.05	122	2.46
Florida.....	574	3.69	64	.41
Georgia.....	365	1.25	282	.97
Idaho.....	0		0	
Illinois.....	1,305	1.67	1,291	1.65
Indiana.....	204	.62	212	.64
Iowa.....	148	.60	172	.69
Kansas.....	155	.82	74	.39
Kentucky.....	199	.75	293	1.11
Louisiana.....	186	.86	106	.49
Maine.....	67	.84	49	.61
Maryland.....	811	4.88	259	1.56
Massachusetts.....	410	.95	468	1.09

See footnotes at end of table.

## Cases of venereal diseases reported for January 1935—Continued

State	Syphilis		Gonorrhoea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Michigan.....	546	1.08	547	1.08
Minnesota.....	303	1.17	244	.94
Mississippi.....	1,070	8.23	1,703	8.82
Missouri.....	704	1.92	460	1.25
Montana.....	28	.52	21	.39
Nebraska.....	47	.84	87	.63
Nevada <sup>1</sup> .....				
New Hampshire <sup>1</sup> .....				
New Jersey.....	510	1.22	246	.69
New Mexico.....	74	1.71	36	.83
New York.....	5,493	4.24	1,624	1.25
North Carolina.....	931	2.84	296	.90
North Dakota.....	20	.29	56	.82
Ohio.....	777	1.14	213	.31
Oklahoma.....	162	.78	121	.58
Oregon.....	71	.72	80	.81
Pennsylvania.....	321	.33	283	.29
Rhode Island.....	98	1.40	112	1.00
South Carolina.....	315	1.80	414	2.37
South Dakota.....	5	.07	38	.54
Tennessee.....	1,010	3.79	560	2.10
Texas.....	184	.31	46	.08
Utah <sup>1</sup> .....				
Vermont.....	19	.53	29	.80
Virginia <sup>2</sup> .....	303	1.24	236	.97
Washington.....	220	1.38	216	1.35
West Virginia <sup>3</sup> .....				
Wisconsin <sup>4</sup> .....	38	.13	111	.87
Wyoming <sup>1</sup> .....				
Total.....	20,379	1.72	13,006	1.10

<sup>1</sup> Not reporting.<sup>2</sup> Has been reporting regularly but no report received for current month.<sup>3</sup> Incomplete.<sup>4</sup> Only cases of syphilis in the infectious stages are reported.

NOTE.—Surveys in which all medical sources have been contacted in representative communities throughout the United States have revealed that the monthly rate per 10,000 population is 6.6 for syphilis and 10.2 for gonorrhoea.

## WEEKLY REPORTS FROM CITIES

City reports for week ended Mar. 9, 1935

[This table summarizes the reports received regularly from a selected list of 121 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.]

State and city	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
	Cases	Deaths								
Maine:										
Portland.....	0	1	0	1	4	0	0	0	7	31
New Hampshire:										
Concord.....	0		0	0	1	2	0	0	0	16
Nashua.....	0		0	0	0	0	0	0	0	0
Vermont:										
Barre.....	0		0	0	0	0	0	0	0	3
Burlington.....	0		0	29	0	9	0	0	0	9
Massachusetts:										
Boston.....	4		0	25	27	44	0	0	25	230
Fall River.....	0		0	70	3	1	0	1	0	8
Springfield.....	0		0	159	1	6	0	1	0	24
Worcester.....	0		0	1	10	13	0	2	0	13
Rhode Island:										
Pawtucket.....	0		0	0	0	0	0	0	0	19
Providence.....	0		1	58	7	13	0	1	0	8
Connecticut:										
Bridgeport.....	2		2	1	1	16	0	1	0	0
Hartford.....	0		0	90	0	6	0	1	0	10
Haven.....	0		1	222	6	0	0	2	0	47

City reports for week ended Mar. 9, 1935—Continued

State and city	Influenza		Meas-les cases	Pneu-monia deaths	Scar-let fever cases	Small-pox cases	Tuber-culosis deaths	Ty-phoid fever cases	Whoop-ing cough cases	Deaths, all causes	
	Diph-theria cases	Cases									Deaths
<b>New York:</b>											
Buffalo	0		1	267	26	29	0	7	0	24	166
New York	18	20	8	702	161	630	0	122	3	247	1,632
Rochester	0		0	275	5	18	0	2	0	22	73
Syracuse	0		1	124	6	6	0	1	1	32	59
<b>New Jersey:</b>											
Camden	2	5	0	0	4	4	0	1	0	5	47
Newark	0		1	241	9	23	0	5	0	76	111
Trenton	0		0	28	5	9	0	1	0	3	39
<b>Pennsylvania:</b>											
Philadelphia	4	7	6	10	51	111	0	29	0	91	531
Pittsburgh	1	9	1	737	47	37	0	3	0	29	179
Reading	0		0	15	1	5	0	1	0	2	25
Scranton	0			377		2	0		0	6	
<b>Ohio:</b>											
Cincinnati	7		4	3	21	34	0	9	0	2	151
Cleveland	8	56	0	247	19	40	0	14	0	58	216
Columbus	12	1	1	117	7	39	0	4	0	1	88
Toledo	0		0	49	8	13	0	3	0	4	73
<b>Indiana:</b>											
Fort Wayne	1		0	22	2	2	0	1	0	0	29
Indianapolis	1		0	38	21	37	0	4	0	0	
South Bend	0	1	1	10	2	5	0	0	0	0	23
Terre Haute	0		0	0	0	0	0	0	0	0	23
<b>Illinois:</b>											
Chicago	3	9	8	1,198	65	707	0	39	0	81	592
Springfield	0		1	10	1	11	0	0	0	1	25
<b>Michigan:</b>											
Detroit	7	5	2	800	34	180	0	6	0	99	262
Flint	3		0	574	10	11	0	0	0	4	29
Grand Rapids	0		0	78	2	10	0	1	0	9	34
<b>Wisconsin:</b>											
Kenosha	0	1	1	323	1	29	0	0	0	8	4
Milwaukee	0	1	1	571	12	234	0	3	0	30	127
Racine	0	1	1	36	0	4	0	0	0	6	10
Superior	0		0	298	0	2	0	0	0	1	3
<b>Minnesota:</b>											
Duluth	0		0	0	3	3	0	0	0	0	26
Minneapolis	2		0	1,192	6	69	0	0	0	13	94
St. Paul	1	1	1	12	9	37	0	0	0	4	67
<b>Iowa:</b>											
Davenport	0			1		1	0		0	0	
Des Moines	4			66		24	0		0	0	48
Sioux City	0			11		1	0		0	3	
Waterloo	1			1		5	0		0	2	
<b>Missouri:</b>											
Kansas City	3	2	0	194	14	11	0	4	0	4	96
St. Joseph	1		0	7	4	2	0	1	0	1	12
St. Louis	12		0	11	8	20	0	5	1	5	184
<b>North Dakota:</b>											
Fargo	0		0		3	27	0	1	0	4	13
Grand Forks	0			0		1	0		0	0	
<b>South Dakota:</b>											
Aberdeen	0			9		0	0		0	4	
Sioux Falls	0			0		2	0		0	0	5
<b>Nebraska:</b>											
Omaha	0		2	28	8	9	4	2	0	0	62
<b>Kansas:</b>											
Topeka											
Wichita	0		0	337	4	2	0	2	0	2	36
<b>Delaware:</b>											
Wilmington	0		0	2	3	13	0	0	0	2	23
<b>Maryland:</b>											
Baltimore	3	16	2	9	35	54	0	16	1	17	241
Cumberland	0	1	1	9	1	2	0	1	0	0	19
Frederick	0		0	0	1	2	0	0	0	0	7
<b>District of Columbia:</b>											
Washington	13	3	0	32	26	65	0	16	0	4	175
<b>Virginia:</b>											
Lynchburg	0		0	216	1	5	0	0	0	8	11
Norfolk	1	2	0	33	8	3	0	2	0	16	34
Richmond	1		4	113	11	3	0	3	1	0	78
Roanoke	0		1	20	3	1	0	0	0	3	27
<b>West Virginia:</b>											
Charleston	2		0	29	1	1	0	1	0	0	10
Huntington	1			35		3	0		0	7	
Wheeling	0		0	97	2	23	0	1	0	8	21

## City reports for week ended Mar. 9, 1935—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small-pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
North Carolina:											
Raleigh	0	0	0	1	4	0	0	1	0	0	18
Wilmington	0	0	0	0	5	1	0	0	0	3	18
Winston-Salem	0	2	0	16	1	1	0	0	0	26	11
South Carolina:											
Charleston	0	11	0	7	5	3	0	3	1	0	29
Columbia	0	0	0	0	3	0	0	0	0	0	43
Greenville	0	0	0	0	4	1	0	0	0	0	9
Georgia:											
Atlanta	5	23	3	1	8	4	0	8	0	1	90
Brunswick	0	0	0	0	0	0	0	0	0	0	6
Savannah	0	18	1	1	0	1	0	1	0	1	36
Florida:											
Miami	2	4	0	1	3	1	0	1	0	3	32
Tampa	2	3	3	2	2	1	0	2	1	0	26
Kentucky:											
Ashland	0	4	0	2	0	1	0	0	0	2	19
Lexington	2	0	0	25	2	0	0	0	0	0	59
Louisville	3	3	0	406	9	29	0	6	0	10	59
Tennessee:											
Memphis	4	0	4	2	20	6	0	5	0	7	89
Nashville	0	0	2	2	10	3	0	1	0	8	58
Alabama:											
Birmingham	1	17	5	11	3	4	0	3	0	0	73
Mobile	1	0	4	0	3	0	0	1	0	0	25
Montgomery	0	0	0	24	0	0	0	0	0	2	0
Arkansas:											
Fort Smith	1	0	0	19	1	0	0	1	0	0	3
Little Rock	0	0	0	0	0	0	0	0	0	0	0
Louisiana:											
New Orleans	22	10	7	7	26	9	0	10	0	0	162
Shreveport	0	0	0	12	10	2	1	2	0	0	47
Texas:											
Dallas	5	2	2	0	10	0	0	4	0	1	74
Fort Worth	0	0	2	0	9	6	0	0	0	0	64
Galveston	0	0	0	0	1	2	0	0	0	0	19
Houston	3	0	2	2	9	2	3	6	1	0	93
San Antonio	4	0	8	1	11	1	0	5	0	0	69
Montana:											
Billings	4	0	0	0	0	3	0	0	0	0	12
Great Falls	0	0	0	0	0	0	0	0	0	2	3
Helena	0	0	0	76	1	1	0	0	0	0	3
Missoula	0	0	0	0	1	0	0	1	0	1	11
Idaho:											
Boise	0	0	0	2	1	0	0	0	0	0	4
Colorado:											
Denver	5	39	0	332	7	260	1	6	0	4	74
Pueblo	0	0	0	114	1	2	0	1	0	9	7
New Mexico:											
Albuquerque	0	0	1	5	2	2	0	1	0	12	15
Utah:											
Salt Lake City	0	0	1	16	2	82	0	1	0	43	35
Nevada:											
Reno	0	0	0	0	1	2	0	0	0	0	4
Washington:											
Seattle	0	0	0	50	0	8	4	0	0	2	0
Spokane	0	0	0	113	5	3	0	1	0	0	49
Tacoma	0	0	0	8	4	3	11	0	0	0	24
Oregon:											
Portland	0	0	0	58	5	11	0	2	0	1	98
California:											
Los Angeles	17	80	3	27	17	75	1	17	0	9	347
Sacramento	4	0	0	26	3	7	0	2	1	0	28
San Francisco	0	2	0	13	7	29	0	9	0	10	166

City reports for week ended Mar. 9, 1935—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				District of Columbia:			
Boston.....	1	1	0	Washington.....	11	6	0
Connecticut:				Virginia:			
New Haven.....	1	0	0	Lynchburg.....	1	0	0
New York:				Georgia:			
New York.....	13	3	1	Atlanta.....	1	0	0
Pennsylvania:				Kentucky:			
Philadelphia.....	1	2	0	Louisville.....	2	0	0
Pittsburgh.....	3	2	0	Tennessee:			
Ohio:				Memphis.....	1	0	0
Cincinnati.....	7	1	1	Alabama:			
Cleveland.....	4	2	0	Birmingham.....	2	0	0
Toledo.....	0	1	0	Louisiana:			
Indiana:				New Orleans.....	3	0	0
Indianapolis.....	1	0	0	Texas:			
Illinois:				Dallas.....	0	1	0
Chicago.....	14	10	0	Fort Worth.....	1	0	0
Wisconsin:				Colorado:			
Milwaukee.....	0	1	0	Denver.....	0	0	1
Minnesota:				New Mexico:			
Minneapolis.....	1	1	0	Albuquerque.....	1	1	0
Iowa:				Utah:			
Des Moines.....	2	0	0	Salt Lake City.....	1	1	0
Missouri:				Washington:			
Kansas City.....	1	0	0	Seattle.....	0		1
St. Louis.....	4	2	0	Spokane.....	0	1	0
Nebraska:				California:			
Omaha.....	0	2	0	Los Angeles.....	0	0	7
Maryland:							
Baltimore.....	1	2	0				

Dengue.—Miami, 1 case.

Epidemic encephalitis.—Cases: New York, 3; Pittsburgh, 1; Cleveland, 2.

Pellagra.—Cases: Savannah, 3; Birmingham, 1; New Orleans, 1; Los Angeles, 1; San Francisco, 1.

## FOREIGN AND INSULAR

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### MEXICO

*Smallpox.*—A report dated March 15, 1935, states that smallpox has been reported in Mexico, as follows: During the week ended January 26, 1935, 1 case was reported in the city of Juarez. In the city of Chihuahua, Chihuahua State, 3 cases of smallpox were reported during January 1935, 6 cases during February, and 11 cases during March. Deaths from smallpox were reported during January 1935, as follows: 1 at Saucillo, 2 at Guadalupe, 1 at Carichic, 2 at Batopilas, 1 at Cienega de Ortiz, and 3 at Neoqui. During the month of February 1935 a total of 17 deaths was reported as follows: 3 at Cienega de Ortiz, 5 at Neoqui, and 9 at Villadama. Intense vaccination is being carried on, the entire population of Oja Caliente, Chihuahua State, being vaccinated.

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**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued**

**PLAGUE—Continued**

[C indicates cases; D, deaths; P, present]

Place	Aug- ust 1934	Septem- ber 1934	October 1934	Novem- ber 1934	Decem- ber 1934	January 1935	Place	Aug- ust 1934	Septem- ber 1934	October 1934	Novem- ber 1934	Decem- ber 1934	Janu- ary 1935
Argentina (see also table above).....	C 6	11					Madagascar (central region)...	C 160	201	444	431	381	
Azores.....	C 5	2			1		Peru.....	D 158	283	422	410	364	
British East Africa (see also table above).....							Sensgal.....	C 1	2	3	1	1	5
Kenya.....	C 13	5	1	6			Dakar II.....	C 52	17	13	4	2	2
Uganda.....	C 103	64		3			Diourbel II.....	D 47	19	11	3	2	2
China: Kwangchowan.....	C 3			3			Rufisque II.....	C 5	1				
Indo-China (see also table above).....	D 3	3	4	4	2	1	Tiêls II.....	C 42	18	8	4		1
Cambodia.....	D 2	1		2			Tiyeouane II.....	C 39	6	6	6		
Cochin-China.....	C 2							82	26	21	3	1	

ii Reports incomplete.

**SMALLPOX**

[C indicates cases; D, deaths; P, present]

Place	Week ended—				
	July 25, 1934	Aug. 29, 1934	Sept. 27, 1934	Oct. 24, 1934	Nov. 21, 1934
Algeria:					
Algiers Department.....					
Constantine Department.....			1		
Angola. (See table below).....		1			
Bahian Congo (see also table below).....	C 2	5			102
Bahia. (See table below).....					5
Brazil.....					
Porto Alegre (alastrim).....	C 5	2	1		
Recife.....					
Sergipe State.....					P





Pondichery.....	C	170	228	99	89	34	30	7	84	27	30	17	21	23	25	24	-----
India (Portuguese).....	D	103	147	51	45	22	31	6	20	20	20	17	16	17	20	24	-----
Indo-China (see also table below):																	
Haiphong.....	C	1	1								1						-----
Fnom-Penh.....	D	9	3	4	3	1	1	1	1	3	1	1	1	1	1	3	-----
Tourane.....	C	5	11	3	1	10	2	5	13	2	20	16	2	2	2	1	-----
Iraq.....	C	6	6	2	1	1	6			2	1	1	1	2	2		-----
Arbil.....	C	2	1	1													-----
Baghdad.....	C																-----
Basra.....	C																-----
Mosul liwa.....	C						1		5			7		2			-----
Italy:																	
Genoa.....	C	8	2														-----
Milan.....	C	2															-----
Japan.....	C				1	26	55	33	27								-----
Kobe.....	C																-----
Taiwan.....	D									1	1						-----
Liberia. <sup>1</sup>																	-----
Lithuania. (See table below.)																	-----
Mexico:																	
Chihuahua.....	C		1		2	1	2	2	7	6		5	1	1		5	2
Mazatlan. <sup>2</sup>																	-----
Mexico, D. F.....	C	6	8	6		1			6								-----
Monterrey.....	C	1															-----
San Luis Potosi.....	D					1											-----
Teitipac. <sup>3</sup>																	-----
Morocco. (See table below.)																	-----
Mozambique. (See table below.)																	-----
Nigeria.....	C	239	215	159	115		142	38	74	74	8						-----
Nyasaland.....	C	3	5														-----
Pakistan.....	C	3	2	7	4	1	1							2	3	4	-----
Persia.....	C	1		1	2	1	1				22	17	21				-----
Teheran.....	D		1	1	1								1				-----
Peru. (See table below.)																	-----
Poland.....	C		1	1	1												-----
Portugal (see also table below):																	-----
Lisbon.....	C				2					1							-----
Oporto.....	C		1		1			1									-----
Portuguese East Africa. (See table below.)																	-----

<sup>1</sup> For 2 weeks.<sup>2</sup> A report dated Mar. 7, 1935, states that from Jan. 31, 1935, 20 cases of smallpox were reported at Welitara, Ceylon.<sup>3</sup> Imported.<sup>4</sup> A report states that from February to Sept. 10, 1934, 233 cases of smallpox, with 79 deaths, had been reported in Sanoyea, Liberia. All sanitary measures have been taken.<sup>5</sup> A report dated Dec. 29, 1934, states that about 48 cases of smallpox, with 6 or 6 deaths, had been reported at Allende, Mexico.<sup>6</sup> A report dated Aug. 27, 1934, states that smallpox has appeared in the suburbs of Mazatlan, Sinaloa, Mexico; the report also states that 104 deaths from smallpox have occurred in Teitipac, Oaxaca, Mexico.

**CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued**

**SMALLPOX—Continued**

[C indicates cases; D, deaths; P, present]

Place	Week ended—													
	December 1934						January 1935						February 1935	
	1	8	15	22	29		5	12	19	26	2	9	16	23
Salvador.....														
Siam.....							7	27	1					
Bangkok.....											3	12	1	
Sierra Leone.....														
Spain.....							1	129	1	43	1	80	1	25
Straits Settlements: Singapore.....							7	29	15	14	7	4		3
Sudan (Anglo-Egyptian).....														8
Syria:.....														
Beirut.....														1
Damascus.....														
Provinces.....							26	19		4		6		2
Trans-Jordan.....							32	78	51	18	17	1	18	9
Tunisia.....														
Turkey..... (See table below.)														
Union of South Africa.....														
Union of Soviet Socialist Republics. (See table below.)														

**On vessels:**

S. S. <i>Ethiopia</i> at Rangoon from Madras.....	1 case.	Sept. 3, 1934
S. S. <i>Usuri Maru</i> at Kobe from Dairen.....	1 case.	Sept. 24, 1934
S. S. <i>Rohna</i> at Penang from Madras.....	1 case.	Oct. 4, 1934
S. S. <i>Erimpara</i> at Rangoon from Madras.....	1 case.	Oct. 8, 1934
S. S. <i>Kwang-Si</i> at Jibuti.....	1 case.	Nov. 24, 1934
S. S. <i>Varela</i> at Basra.....	1 case.	Dec. 8, 1934

**On vessels—Continued.**

S. S. <i>Taiwa</i> at Hong Kong.....	Present.	Jan. 19, 1935
S. S. <i>Aorangi</i> at Sydney from Vancouver.....	1 case.	Jan. 24, 1935
S. S. <i>Hosana</i> at Singapore from Osaka.....	1 case.	Jan. 2, 1935
S. S. <i>Manoala</i> at Suva from Australia.....	1 case.	Feb. 24, 1935
S. S. <i>Tatuta Maru</i> at San Francisco.....	1 case.	Mar. 14, 1935
S. S. <i>Tatuta Maru</i> at San Francisco.....	1 case.	Mar. 14, 1935

1 For 2 weeks.

‡ Imported.

† For 3 weeks.





Country	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Nagsaki.....	D							1	8	4		3	3	7		9	7								6
Latvia. (See table below.)	C																								
Lithuania.....			3																						
Mexico:																									
Guadalajara.....	D																								
Mexico, D. F.....	26		14				34	3	18	7	8														
Saltillo.....	2																								
San Luis Potosi.....	2																								
Torreon.....	5																								
Morocco.....	1							7	2	6	1	1	1	3	3	1									1
Palestine.....	3																								6
Halifa.....	1							12	12	2	1	1	2												1
Jaffa.....	1																								
Persia.....	47		19	10	5			3	5	10	25	19	9	22		21	16	12	8						
Teheran.....	7		1																						
Peru. (See table below.)	77	53	48	14	12			16	19	27	12	38	33	14	34	36	60	69	69	82					57
Poland.....	6	1	5	2	1			3	3	4	3	1	1	1	3	1	6	7	4						8
Portugal (see also table below):																									
Oporto.....	1																								
Tarouca (near).....																26									
Rumania. (See table below.)																									
Spain.....	1																								
Straits Settlements: Singapore.....															1										
Syria: Beirut.....	1																								
Trans-Jordan.....	4																								2
Tunisia:																									
Tunis.....	1																								
Tunives.....	18		22	18	1			14	2	10	1	8	21	16	9	2	18	20	10	14					25
Turkey. (See table below.)																									
Union of South Africa. (See table below.)																									
Union of Soviet Socialist Republics. (See table below.)																									
Yugoslavia. (See table below.)																									

Country	Place	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935	Place	August 1934	September 1934	October 1934	November 1934	December 1934	January 1935
Bolivia.....		91	33	46	40	103		Turkey.....	22	10	16	20	32	22
Chosen.....	C	23	7	22	41	29		Union of South Africa:						
Czechoslovakia.....	C							Cape Province.....	272	437	407	223	163	
Greece.....	C	10	7	6	5	15		Natal.....	15	6	29	4	8	
Guatemala.....	C	36	31	18	18	21	31	Orange Free State.....	610	492	403	309	295	
Latvia.....	C			3	3	8	2	Transvaal.....	12	105	32	39	29	
Peru.....	C	24	63	86	52	17		Union of Soviet Socialist Republics.....	1,297	12	31	3	17	
Portugal.....	C	4	4	10	8	27	178	Yugoslavia.....	27					55
Rumania.....	C	24	16	48	85	127								

1 Imported.



